



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| <b>(54) Title:</b> A POCKET MICROSCOPE DEVICE, WITH A LIMITED RUN OF THE EYE-PIECE AND THE AIMED OBSERVATION OF THE SOLE PREPARED FRAME, FOR THE DETERMINATION OF THE WOMAN'S FERTILITY  |           |  |
| <b>(57) Abstract</b>   |           |  |
| <p>A pocket microscope device, with a limited run of the eye-piece and with the aimed observation of the sole prepared frame, for the determination of the woman's fertility, based on a specimen of dry saliva, which comprises a microscope-optic portion (1) with a limited sliding of the eye-piece and an aimed observation of the function surface of the object support, so that the field of vision consists only of the frame of the preparation (dry saliva), and by means of the rotation of the enlargement unit only a further focusing of the frame, depending on possible dioptric defects in the users' eyes, takes place, and which further comprises a lighting unit (2), with a battery (23) that may be replaced following the rotation in the supporting envelope, for lighting the frame of the dry saliva, and an LED (25) with green-yellow beam for lighting the field of vision.</p> |           |  |
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"A POCKET MICROSCOPE DEVICE, WITH A LIMITED RUN OF THE EYE-PIECE AND THE AIMED OBSERVATION OF THE SOLE PREPARED FRAME, FOR THE DETERMINATION OF THE WOMAN'S FERTILITY"

The present invention concerns a pocket microscope device, with a limited run of the eye-piece and with the aimed observation of the sole prepared frame, for the determination of the woman's fertility, based on a specimen of dry saliva.

It is well known that, among the many methods for determining the fertile and the non-fertile days of a woman's cycle, one is based on the observation of dry saliva, the crystals whereof take the shape of fern in the fertile days.

Furthermore, the structure of dry saliva can not be reckognized with the naked eye, but only with the help of a microscope with a determined number of enlargements.

Many different kinds of microscopes are used, begining from those used in laboratories in the health care institutions, to the portable ones.

Among the portable pocket microscopes, a PC-2000 product is known, consisting on an optic enlarge-

ment means, a plane for the saliva, a sleeve of the microscope and an electric, constructive element, characterized in that:

- the optic enlargement element is connected with the container by means of a threading;
- the plane of the object is laterally inserted into the field of vision by means of a slit;
- the lighting takes place by means of a bulb that irradiates white light, the lighting contact is performed by a mechanic switch and the feeding by means of a standard battery of the LR6N kind.

Moreover, said product shows the following inconveniences:

- relating to the container, the optic constructive element is demountable, and may therefore easily get dirty, which makes it difficult to find again the frame on the field of the object, as the run of said optic constructive element is not limited;
- the plane of the object is out of plastic material and demountable, so that the dust particles negatively affect the correct vision of the frame of the dry saliva;
- white light is tiresome for the eyes;

- the mechanic switch (turning on - off) may lead the user to forget to turn it off, using up the battery;
- the great dimension of the instrument and its shape make it little handy for use.

The prior art shows an international Patent no. PCT/IT94/00043, filed by Alberto SOLDINI, and consisting of a demountable optic enlargement element and glass support, in an electric constructive element with a microscope sleeve and a protection cap, in which:

- the whole constructive element of the microscope is taken off for placing the saliva specimen, and the saliva is laid onto said object surface;
- the lighting takes place by means of a yellow LED diode, and a mechanic switch is provided.

The main disadvantages of said patent are:

- the possibility of disassembly of the enlarging optic element and the glass object support: infact, in may happen that the users deposit their saliva, by mistake, onto the surface of the optic lens or on the inner side of the glass object surface; this operation, if often repeated, makes the structure unserviceable; and like for the PC-2000, the finding of the frame

is made difficult, as the run of the constructive optic element has no stop;

- the mechanic switch is unreliable: it often gets blocked and even causes electric current interruptions;
- the replacing of the battery is provided in such a manner that the electric constructive element must be pushed out of the microscope sleeve, which for the user is little practical.

It is the aim of the present invention to solve all above mentioned inconveniences of the known devices in an easy, practical and functional manner.

The aim set forth is reached by means of the device according to the present invention, comprising a microscope-optic portion with a limited sliding of the eye-piece and an aimed observation of the function surface of the object support, which has the advantage, with respect to other existing similar devices, that the field of vision consists only of the frame of the preparation (dry saliva), and that by means of the rotation of the enlargement unit only a further focusing of the frame - depending on possible

dioptric defects in the users' eyes - within +/- 5 dioptries (Dpt), occurs.

And infact, by means of the device according to the present invention, it is obtained that:

- it can not occur that a wrong diagnosis of the fertility is made, with grave consequences, because due to the limited run of the eye-piece, the user has not the possibility of observing a frame of a non functional surface - on which dust particles may be found which may be similar to the frame of the saliva in the period of non-fertility of the woman - instead of the function surface of the object support;
- the systems for the run limitation assure contemporarily that the microscope can not be disassembled; infact, in case of separation of these units, dust or other dirt might get onto the non functional surface, making the observation of the function surface difficult or even impossible, if much dirt enters; should this occur, the microscope would be practically unserviceable, as none of the users has knowledges or means for well cleaning the internal surface so as to make it again optically limpid and transparent;

- the teaching of the user for the discovery and identification of the frame position is useless, as it is the detail of a little "depth of field", which is a feature of small as well as of big microscopes; thus, a great safety and easiness in use is achieved, which is an important feature of all instruments for individual use.

Furthermore, the device according to the present invention is provided with a lighting unit which, for replacing the battery, may be taken off and re-inserted by a light rotation in the supporting envelope, and may be respectively close or open; said simple and demountable connection is obtained due to suitable projections in the lighting supporting body and corresponding grooves in the supporting envelope. Said constructive solution has the following advantages:

- a simple and practical replacing of the run down batteries: instead of being ejected or inserted in a difficult and non practical way from the container, the electric unit is slightly rotated to the left and taken off from the supporting envelope; now, the first battery is ejected with the help, e.g., of the point of a ball-point pen



through the opening, and the second battery comes out by itself;

- a greater reliability of the operation is assured: infact, inserting the new batteries no jamming occurs because they are always in a stable position.

A further feature of the device according to the present invention consists of the use of a micro-switch, for turning on and off the lighting, so as to obtain the following, further advantages:

- the pressure performed with the finger onto the micro-switch is the slightest, which allows the total concentration of the user; and concentration is fundamental for easily observing and identifying the structure of the dry saliva; an imperfect switch that works in an intermittent way and that during the observation modifies the lighting level, makes the use difficult and sometimes even impossible;
- the current consumption is reduced and the life of the batteries is prolonged, due to the smallest resistance onto the contact surfaces which are protected by external agents, as they are placed inside a non demountable unit of the microswitch.

At last, the field of vision of the device according to the present invention is lighted with a green-yellow ray from a LED; this light colour is not harmful for the eyes and allows - much more than other colours - the identification of even the smallest detail of the saliva, which implies a correct diagnose of the fertility and avoids possible mistakes. In this way, a quick identification and the most comfortable observation of the frame are achieved without any harm for the eyes, as it may occur especially with a prolonged use if, as a light source, a colour beam harmful for the eyes is used.

The device according to the present invention will be described more in detail hereinbelow relating to the enclosed drawings in which some embodiments are shown.

Figure 1 shows a scheme of a non demountable microscope device with a limited run of the eyepiece and an aimed observation of the function surface of the object support, according to the present invention.

Figures 2 and 3 show a variant of the microscope unit with an inclination cam.

Figure 4 shows a variant of a microscope unit according to the present invention, with a stop system.

Figure 5 shows the details of the lighting and electric feeding elements.

Figure 6 shows a scheme of the inner structure of the container, according to figure 1.

The enclosed figures show a pocket microscope device, with a limited run of the eye-piece and with the aimed observation of the sole prepared frame, for the determination of the woman's fertility, mainly consisting of a mini-microscope unit 1, of an electric unit 2 for lighting the dry saliva frame, of a support container 3 and of a coating envelope 4.

The mini-microscope 1 is placed in the high part of the support container 3, and the six grooves 5, symmetrically performed in the container, allow a slow microscope insertion and extraction movement, preventing at the same time its rotation in the container during the focusing of the dry saliva frame; in the lower part of the container said electric unit 2 is placed which, by means of cams

6 and corresponding grooves 7, forms an easily demountable connection.

In both variants shown in figures 2, 3 and 4, the microscope according to the present invention consists of two small units: an enlarging unit 1, consisting of an optic portion 9 placed in the fitting 8, and a unit 10 consisting of an object support 11 and of its fitting 12. The optic portion and the object support are glued in their fittings. The optic part contains a plurality of lens.

Units 1 and 10 are movable in opposition, and at the same time their connection is of the non demountable kind.

In the variant with the inclination cam, shown in figures 2 and 3, the rotation of the enlargement unit 1 in the object support fitting 12, takes place on the smooth surface of a cylinder 13; in the fitting of the optic portion 8, 15 an inclination cam 14 is provided. During the rotation of the enlarging unit 1, a stop 16 slides along said cam and said stop, resting on the sides 17 of said cam, limits the axial movement of the enlarging

unit 1 with respect to the object support unit, i.e. the function surface 18.

The stop is asymmetric, i.e. eccentric, and is glued to fitting 12; the position of the cams and of the eccentric base are conceived for guiding the observation always onto the function surface 18 of the object support, onto which the structure of the dry saliva is laid, allowing at the same time a perfect focusing, which means a clear frame, in consideration of the fact that a great number of users has a dioptric defect in their eyes. The sliding positions are therefore determined by the end 19 of the cams.

In the second variant with the stop system as shown in figure 4 and according to the present invention, the rotation connection and the longitudinal displacement of unit 1 in fitting 22, are performed by means of the connection of threading 12, where the stop system 20, 21 is in a precisely definite relationship, which allows the sole observation of the function surface of the object support, sliding limitation as well as a perfect focusing, i.e. a clear frame in relation to the dioptric defects in the eyes of the user. Furthermore, the impossibility of disassembly of

units 1, 10 is determined by the fix connection of the stop system 21 with the support of the optic portion 8 and of the stops 20, linked together to the fitting 12 of the object support.

The lighting of the dry saliva frame takes place by means of the independent unit shown in figure 5, consisting of a body in which batteries 23, a spring 24, the insulation surface and the micro-contact units are arranged, and on the upper part whereof the LED 25, that irradiates the green-yellow light, and the resistance 26 are arranged.

Three cams 6 are duly provided onto the body of said unit, and during the insertion of said unit into the support container 3 they are inserted into grooves 7, forming an easily demountable connection.

The opening 27 provided on said body is for pushing the upper battery with the help, e.g., of the point of a ball-point pen, when the batteries are to be replaced, so that both batteries come out from opening 28; all parts, apart from the batteries, are firmly fixed to the body.

The use of the device according to the present invention may be described as follows:

- the coating envelope 4 is removed;
- the microscope unit 1 is taken out from the support container 3;
- the user lays a thin layer of saliva onto the surface 18;
- the microscope is put again into the support container; 5 minutes must pass, before
- the eye is neared to the eye-piece and the light is turned on by a pressure of the forefinger onto the micro-switch 29; without turning the eye-piece, the user will see in her own field of vision the frame of the dry saliva;
- by means of a small rotation of the eye-piece, the frame is perfectly focused in the way corresponding to the possible dioptric defect in the eyes of the user; according to the structure of the frame, the fertility or the non-fertility may be ascertained.

With the help of the device according to the present invention, it is impossible for the user to focus a wrong or a non functional surface obtaining a wrong diagnosis, while in other variants, in which the run of the eye-piece is not

limited, it often occurs that a non functional surface is focused and a wrong diagnosis obtained.

At the end of the test, the remaining saliva is removed from the syrface 18 and the microscope unit is placed again into the coating envelope 4.



## CLAIMS

1. A pocket microscope device, with a limited run of the eye-piece and with the aimed observation of the sole prepared frame, for the determination of the woman's fertility, based on a specimen of dry saliva, of the kind with an optic enlargement means, a plane for the saliva, a sleeve of the microscope and an electric, constructive element, characterized in:

- a microscope-optic portion (1) with a limited sliding of the eye-piece and an aimed observation of the function surface of the object support, so that the field of vision consists only of the frame of the dry saliva, and by means of the rotation of the enlargement unit only a further focusing of the frame, depending on possible dioptric defects in the users' eyes, assuring at the same time also the impossibility of disassembly of the microscope;
- a lighting unit (2), with a battery (23) that may be replaced following to the rotation in the supporting envelope, due to the presence of projections in the supporting body and to corresponding grooves on the supporting envelope;
- a LED (25) with a green-yellow beam for lighting the field of vision.

2. A device according to claim 1, characterized in a mini-microscope unit (1), of an electric unit (2) for lighting the dry saliva frame, of a support container (3) and of a coating envelope (4), wherein said mini-microscope (1) is placed in the high part of the support container (3), and the six grooves (5), symmetrically performed in the container, allow a slow microscope insertion and extraction movement, preventing at the same time its rotation in the container during the focusing of the dry saliva frame; in the lower part of the container said electric unit (2) is placed which, by means of cams (6) and corresponding grooves (7), forms an easily demountable connection.
3. A device according to claim 1, characterized in that said microscope consists of an enlarging unit (1), consisting of an optic portion (9) placed in the fitting (8), and of a unit (10) consisting of an object support (11) and of its fitting (12), wherein both said parts are glued in their fitting, movable in opposition and linked in a non demountable manner.
4. A device according to claims 1 and 3, characterized in that said microscope is provided with an inclination cam with eccentric stop and in

that the rotation of the enlargement unit (1) in the object support fitting (12), takes place on the smooth surface of a cylinder (13), while in the fitting of the optic portion (8, 15) an inclination cam (14) is provided, so that during the rotation of the enlarging unit (1), a stop (16) slides along said cam and said stop, resting on the sides (17) of said cam, limits the axial movement of the enlarging unit (1) with respect to the object support unit, i.e. the function surface (18).

5. A device according to claims 1 and 3, characterized in that the rotation connection and the longitudinal displacement of unit (1) in fitting (12), are performed by means of the connection of threading (22), where the stop system (20, 21) is in a precisely definite relationship, which allows the sole observation of the function surface of the object support, while the impossibility of disassembly of units (1, 10) is determined by the fix connection of the stop system (21) with the support of the optic portion (8) and of the stops (20), linked together to the fitting (12) of the object support.

6. A device according to all preceding claims, characterized in that the lighting of the dry saliva frame takes place by means of the independent unit consisting of a body in which batteries (23), a spring (24), the insulation surface and the micro-contact units are arranged, and on the upper part whereof the LED (25) that irradiates the green-yellow light, and the resistance (26) are arranged, while three cams (6) are duly provided onto the body of said unit, and during the insertion of said unit into the support container (3) they are inserted into grooves (7), forming an easily demountable connection, while openings (27) and (28) are for the replacing of said batteries (23).

7. A device according to all preceding claims, characterized in that when a micro-switch (29) is operated, and without rotating the eye-piece, the frame of the dry saliva appears in the field of vision.

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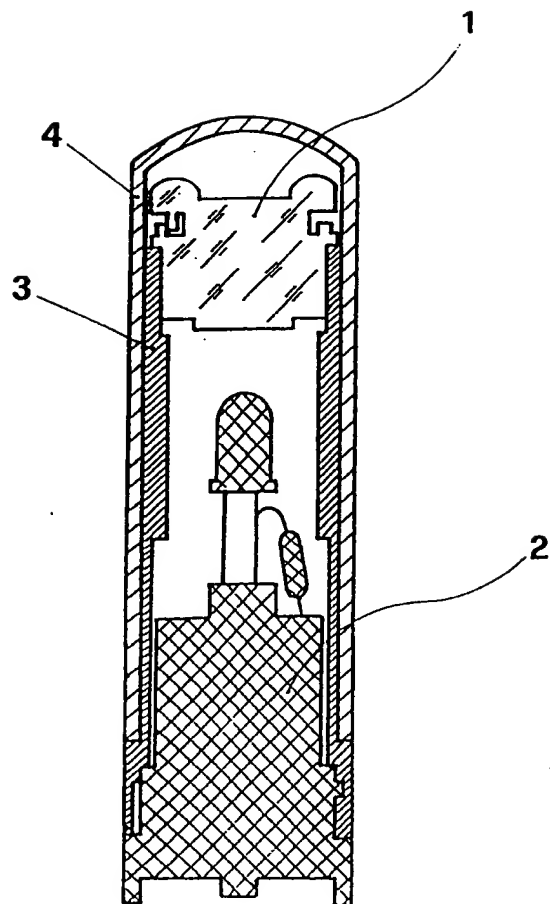


Fig. 1

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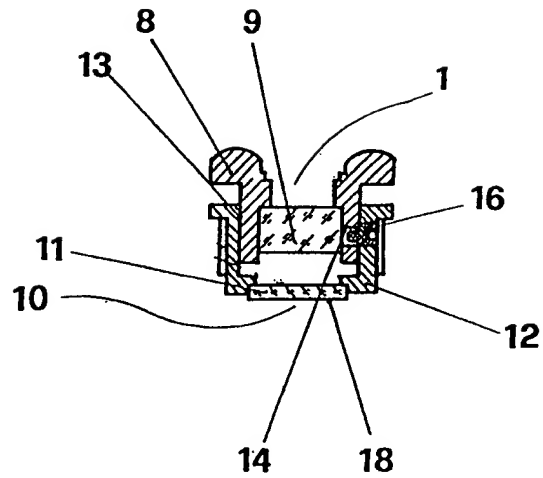


Fig. 2

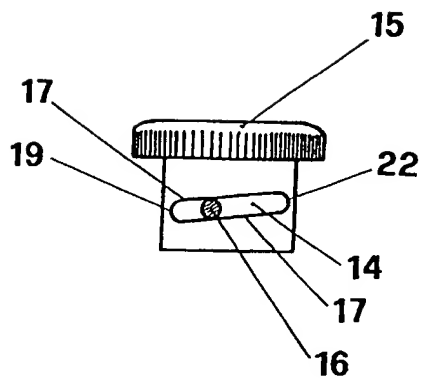


Fig. 3

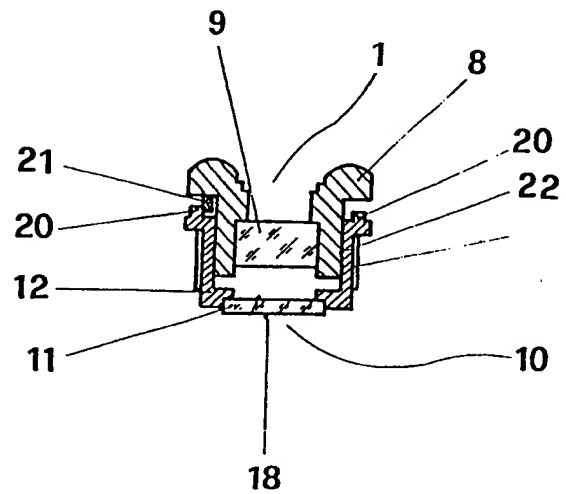
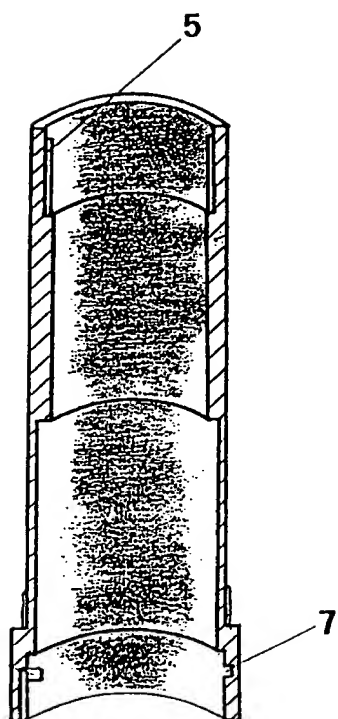
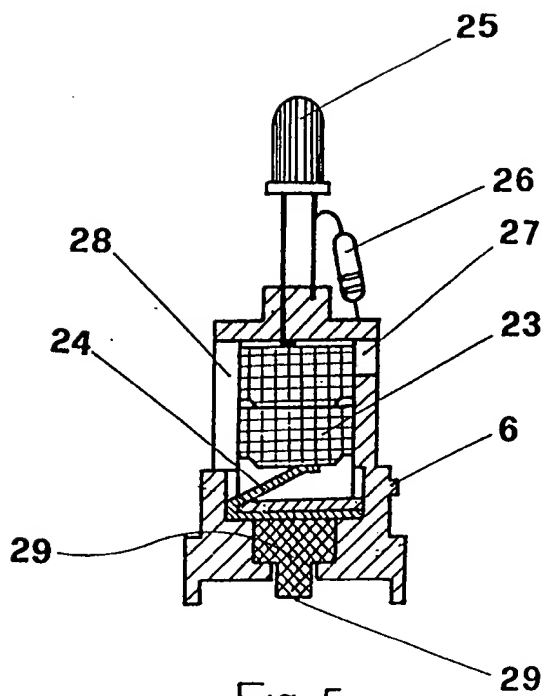


Fig. 4

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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 96/01497

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 G02B21/00 A61B10/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 G02B A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No. |
|------------|--|-----------------------|
| A          | GB 2 190 765 A (ORTUETA CORONA LUIS FERNANDO) 25 November 1987<br>see column 2, line 101 - column 3, line 64<br>see claim 1<br>see figure 1<br>---                     | 1                     |
| A          | WO 95 28130 A (SOLDINI ALBERTO) 26 October 1995<br>cited in the application<br>see page 4-5<br>see figures 1-3<br>---  | 1                     |
| A          | PATENT ABSTRACTS OF JAPAN<br>vol. 096, no. 008, 30 August 1996<br>& JP 08 094616 A (BESUTEKUSU KK; EASTERN OPT CORP:KK), 12 April 1996,<br>see abstract<br>---<br>-/-- | 1                     |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Int. Application No  
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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages            | Relevant to claim No. |
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| A          | US 3 582 181 A (DOLORES MARIA) 1 June 1971<br>see column 1, line 34 - line 41<br>see figure 2 | 1                     |
| A          | DE 510 370 C (SCHIECK) 18 October 1930<br>see claim 1<br>see figure 1                         | 1                     |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s)   | Publication<br>date  |
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